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U. S. DEPARTMENT OF AGRICULTURE.

REPORT

OF THE

CHIEF OF THE BIOLOGICAL SURVEY

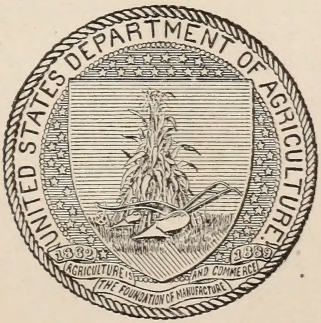
FOR

1903.

BY

C. HART MERRIAM.

[From Annual Reports, Department of Agriculture.]



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REPORT OF THE CHIEF OF THE DIVISION OF BIOLOGICAL SURVEY.

U. S. Department of Agriculture,
Division of Biological Survey,
Washington, D. C., September 25, 1903.

Sir: I have the honor to submit herewith a report of the work of the Biological Survey for the fiscal year ending June 30, 1903, with outline of work for 1904, and recommendations for 1905.

Respectfully,

C. Hart Merriam, *Chief.*

Hon. James Wilson, *Secretary.*

WORK OF THE YEAR.

As heretofore, the work of the Biological Survey has been conducted along the three lines laid down by Congress: (1) Investigations relating to the geographic distribution of animals and plants, including biological surveys and the determination of the life and crop belts, in charge of the chief; (2) investigations of the economic relations of birds to agriculture, in charge of F. E. L. Beal; (3) supervision of matters relating to game preservation and protection and the importation of foreign birds and animals, in charge of T. S. Palmer.

SECTION OF GEOGRAPHIC DISTRIBUTION.

Field work in connection with the study of the geographic distribution of mammals, birds, and plants has been carried on over wide areas in California, Texas, New Mexico, Arizona, and Alaska, and also in several States of Mexico.

In California the preparation of a reliable biological map—a map showing the positions and boundaries of the life and crop belts—is rendered particularly difficult by the extraordinary topographic and climatic diversity of the land, distances of a mile or less sometimes bringing complete changes in the fauna and flora. Within the limits of the State may be found practically all the climates of the continent save the humid tropical. There are Alpine summits clad in perpetual snow, torrid deserts hotter and drier than those of Africa, and areas of excessive humidity where frequent fogs and heavy rains favor the growth of one of the noblest forests in the world.

In most States the running of a few lines suffices to give a key to the chief facts of distribution and makes it possible to map the zones with approximate accuracy, but in California nothing can be taken for granted, and it is necessary to spread a network of lines over the State before the complicated zone boundaries can be laid down with any

degree of confidence. Each valley and each slope has a climatic individuality and a corresponding fitness or capacity for particular crops. Some are cool enough for apples, cherries, and sugar-beets; others hot enough for almonds, raisin grapes, and the citrous fruits. Furthermore, in cases where several areas are adapted to the cultivation of the same crop, it frequently happens that the crop matures in the different areas at widely different dates. The commercial importance of this knowledge it is hard to exaggerate.

In the lowlands some striking differences are noticeable in the animals and plants of places of the same altitude and latitude. These differences may be explained by the circumstance that certain valleys are bathed in rivers of fog, while others are continually exposed to the scorching rays of the summer sun, which, beating for months through cloudless skies, dries up the moisture and bakes the soil. In the mountains it often happens that conspicuous differences in the fauna and flora occur on opposite sides of the same hill. This is caused by the angle of the slope with reference to the position of the sun, slopes facing the north and northeast having a temperature so much lower as to permit the existence of species different from those able to survive on the hot south and southwest slopes.

The agricultural interests of California are enormous. In the year 1902 the farm value of fruits and fruit products shipped from the State amounted to $35,000,000; of wheat, barley, and flour, $21,250,000; of hops and beet-sugar about $2,000,000 each, or, in all, upward of $60,000,000. To this should be added the values of vegetables and of dairy and stock products.

Stated in quantities, the shipments of fruits from California in 1902 were:[a]

Exports of fruits from California in 1902.

	Carloads.
Citrous fruits	22,566
Cured fruits	15,194
Green deciduous fruits	10,039
Canned fruits	8,063
Raisins	4,757
Nuts	1,091
Total exports of fruit in 1902	61,713

During the same year the exports of wine and brandy amounted to 8,868 carloads, and of vegetables to 6,956 carloads.

In view of these facts and of the rapidly increasing agricultural population of the State, the importance of a biological map showing the areas adapted to particular crops is obvious. The preparation of such a map was undertaken by the Biological Survey some years ago and has progressed as rapidly as the available funds and difficult character of the country would permit. During the field season of 1902–1903 the work was continued mainly along the western slopes and foothills of the Sierra and in the Coast Ranges between Monterey and San Luis Obispo.

The field parties in charge of Vernon Bailey, chief field naturalist, continued work in Texas and New Mexico. In Texas operations were carried on in the eastern part of the State, about Kerrville and Rocksprings, and in the Panhandle region and portions of the area drained by the Rio Grande, Devils, and Pecos rivers. Explorations were

[a] Statistics from California State Board of Trade.

made also along the western slopes of the Davis and Guadelupe mountains, Texas, and in the Sacramento and White mountains and the Great Salt Valley in New Mexico. After the main parties had disbanded in the fall of 1902, an assistant was detailed to continued field work throughout the winter in the upper Pecos Valley, Tularosa Desert, and Capitan Mountains, New Mexico, and on the plains to the north and east of El Paso, Texas.

As in previous years, the field work in Mexico was in charge of E. W. Nelson, who, with his assistant, E. A. Goldman, worked in the States of Jalisco, Zacatecas, Michoacan, Guerrero, Morelos, Mexico, and Puebla, obtaining much material of value in determining questions of geographic distribution beyond our southern border.

A biological exploration of the lower Mackenzie River and the Barren Grounds between Great Slave and Great Bear lakes was begun in the spring of 1903. This work is in charge of E. A. Preble, who has previously conducted similar explorations in the Hudson Bay and Athabasca regions, for the purpose of obtaining material illustrating the status and distribution of boreal plants and animals.

Mr. Preble's work, in connection with recent field work in Labrador (conducted by Outram Bangs), in northwestern America (under the auspices of the American Museum of Natural History), and in Alaska (carried on for some years past by this Department), will, when completed, furnish a series of transcontinental boreal and arctic explorations, the results of which will make it possible for the first time to discuss with some confidence the relations and distribution of a large number of animals and plants whose homes are restricted to the far north. The work of the Department in Alaska has been greatly embarrassed and handicapped by lack of knowledge of the natural history of parts of America east of that territory.

During the past year our work in Alaska, in charge of Wilfred H. Osgood, was carried on along the base of the Alaska Peninsula, on both coasts, and on several of the lakes and rivers of the interior, notably Lakes Iliamna, Clark, and Becharof, and the Chulitna, Nushagak, and Ugaguk rivers. This region includes the northwestern limit of the Pacific coniferous forest, and also the meeting ground of several life areas. It is therefore a field of unusual importance for biological investigations.

SECTION OF ECONOMIC ORNITHOLOGY.

In the section of economic ornithology the work begun in previous years was pushed toward completion, and some new investigations were undertaken. As in previous years, two distinct lines of work were carried on: (1) in the laboratory, consisting of the examination of stomachs and crops of birds and the tabulation and comparison of their contents; and (2) in the field, consisting of the observation of birds in their haunts, more especially in orchards, gardens, and fields, to discover to what extent they damage crops or destroy insects that infest crops, and of the collection of such insects, seeds, wild fruits, and similar objects as are available for bird food, in order to compare them with the contents of stomachs taken in the same locality and thus determine whether birds choose food because it is most abundant or because it is most palatable.

During the year 2,566 stomachs were received from various collectors throughout the country, making the total number on hand 48,630.

Examination was made of 2,655 stomachs, distributed among various groups as follows:

Woodcock	20	Shrikes	20
Quail, grouse, etc	1,169	Vireos	21
Woodpeckers	69	Warblers	127
Goatsuckers	13	Wrens	98
Flycatchers	71	Thrushes	48
Horned larks	166	Miscellaneous	365
Crows and jays	21		
Orioles	9	Total	2,655
Finches	438		

The results of investigations on a farm in Maryland carried on for several years by Sylvester D. Judd were published in a bulletin entitled "Birds of a Maryland farm" (Bull. No. 17 of the Biological Survey). This work has proved so useful as an aid in ascertaining the economic status of birds that it has been continued, and Doctor Judd has revisited the farm at intervals. The object has been to find out the relations and interactions of birds, insects, and farm crops; to ascertain if any direct checks upon ravages of insects through the actions of birds are noticeable; and to judge as nearly as may be what damage is done to crops by birds themselves, and to what extent this damage is offset by useful services rendered. The first edition of the bulletin was rapidly exhausted; another will soon be issued.

Field studies of the food habits of birds in the principal fruit-growing districts of California were begun in 1901 and have been since continued. F. E. L. Beal, who is personally conducting these important studies, revisited California in February and will remain throughout the fruit season of 1903, visiting the most important fruit-growing regions. In addition to careful field observations he secures stomachs of birds at the localities where the species are alleged to do the most harm and collects such insects and seeds as appear to be available for bird food.

Professor Beal is also investigating complaints of California bee keepers, some of whom claim that certain birds are a great detriment to their business, in that they eat large numbers of worker bees, and even that they sometimes capture queens during their marriage flights. The stomachs of birds sent in by these bee keepers failed, on examination, to support the charges, and it is desirable that enough additional material be collected in the immediate vicinity of the hives to settle the question definitely. In case the alleged damage shall prove to be real, field observations should be made with a view to the discovery of a remedy.

Thus far about 3,500 stomachs of California birds have been examined and the results tabulated. A report on the results may be expected within the year following Professor Beal's return.

Doctor Judd is continuing investigations of the food of American game birds. The subject of game protection has in recent years grown so much in public interest that an accurate knowledge of the food of birds of this group has come to be a necessity. In fact, the Biological Survey is constantly receiving inquiries as to the real economic status of this and that game bird, entirely apart from whatever value it may have as food or as an object of sport. A bulletin devoted to the quail, grouse, and other gallinaceous birds, and including also the woodcock, is well advanced toward completion. The food of wild ducks and other waterfowl will be the subject of another bulletin.

SECTION OF GAME PROTECTION.

The work of game protection is now carried on under three acts of Congress: The Lacey Act of 1900; the egg act of 1903; and the Alaska game law of 1902. The work naturally divides itself into four well-marked lines: (1) Supervision of the importation of birds and mammals; (2) cooperation in restricting interstate shipments of game contrary to law; (3) protection of game in Alaska; and (4) collection and publication of matter relating to game protection.

IMPORTATION OF FOREIGN SPECIES.

During the year 387 permits were issued for the entry of about 629 mammals, 53,106[a] birds, and 2,000 eggs of partridges and pheasants, an increase of 100 permits and 415 mammals compared with the record of 1902. These figures, however, do not show actual entries, as the number of birds imported is often less than the number stated in the permit. Several consignments of game birds were entered. Special efforts have been made to make the service more effective without undue hardship to the importers. The opportunity of evading the law by having birds brought in by passengers necessitates a more rigid enforcement of this feature of the regulations than would otherwise be required, particularly at the port of New York. Passengers bringing five birds or less have the option of declaring these with their other personal baggage before an officer of the customs and landing them without permit; but if more than five are imported a permit in regular form must be obtained. A strict account of the birds thus landed is kept by the customs authorities and reported at the end of each quarter. This arrangement has been found to work satisfactorily at New York and has recently been extended to San Francisco. It avoids much unnecessary friction and delay in the case of persons bringing in a few pet cage birds. Special arrangements also have been made at the port of San Francisco to facilitate the entry of mammals and birds consigned to the National Zoological Park. Heretofore such consignments have been received at frequent intervals, often without previous notice, from the United States consul at Newcastle, New South Wales. With a view to still further improving the service, a careful examination was made at San Francisco in June of the peculiar conditions attending importations from Australia and the Orient. Although the entries at San Francisco are few as compared with those at New York, the danger of introducing injurious species at that port is probably greater than at any other. The completion of the cable from San Francisco to Hawaii, by making it possible to communicate promptly with the inspector at Honolulu, adds much to the effectiveness of the service at both Honolulu and San Francisco.

The prohibition of the entry of certain injurious species is becoming generally understood, and the law seems to be accomplishing all that was expected of it. So far as is known, no prohibited species gained entry into the United States during the year. Two mongooses from Jamaica were killed at Philadelphia; one mongoose from the Philippines and two flying foxes, known also as fruit bats, from Australia, were destroyed at San Francisco; and a consignment of 50 flying foxes which reached New York from Singapore in December was reshipped

[a] Exclusive of canaries. The total number including these birds is 254,633.

to Hamburg, Germany. A few specimens of prohibited species, most of them known to the Department, are in safe keeping in the possession of zoological gardens or private individuals. The mongoose, which was already distributed over Porto Rico and the islands of Hawaii and Oahu prior to the passage of the Lacey Act, has not, so far as known, spread to any new localities in the United States, but the European starlings near New York City and in the lower Hudson River Valley seem to be gradually extending their range into western Connecticut and southwestern Massachusetts. These species have obtained such a strong foothold in the localities named that all that can be done is to prevent them from spreading over other parts of the United States.

INTERSTATE COMMERCE IN GAME.

Through the cordial cooperation of the Attorney-General of the United States and State officials, cases arising from illegal shipment of birds and game have been acted upon more promptly than ever before. Special mention should be made in this connection of the services rendered by the State game commissioner of Illinois, the executive agent of the fish and game commission of Minnesota, and the game wardens of Iowa and Michigan. During the year 35 cases, involving shipment of 3,729 birds,[a] were reported to this Department, as against 39 cases involving the shipment of about 5,000 birds during the preceding year. Since the passage of the act 40 convictions have been secured in cases passing through this Department (25 in Federal courts and 15 in State courts), while about 20 more cases are still pending. In the two Federal cases arising in South Dakota the maximum penalty of $200 was imposed. A number of the cases pending last year it was found necessary to drop because of the impossibility of securing satisfactory evidence or locating the defendants within the time required by the statute of limitation. As resources available for this work are necessarily limited, efforts during the past season were devoted largely to one or two areas in the West where experience had shown illegal shipments to be especially frequent. This concentration of effort gave more satisfactory results, especially in the number of convictions secured.

While illegal shipments of game still occur in large numbers, constantly increasing restrictions imposed by State laws render such shipments more and more difficult, as indicated by the devices resorted to by shippers in order to escape detection. The records of the year show an increase in the shipments by freight of game which formerly was forwarded by express, and in at least one instance game birds from the Northwest were found concealed in bales of hay shipped by slow freight. For successful prevention of such shipments more information must be collected in regard to the methods adopted by the trade in securing and forwarding game for market. It is gratifying to state that the Department has received the cordial cooperation of officers of express and railway companies. Much more attention is paid to such matters than heretofore; and in one notable case, that of an important railway system which formerly brought large quantities of game southwest to Chicago, no illegal shipments were reported. A personal examination also disclosed the fact that in one section of

[a] Not counting 10 barrels of prairie chickens, which included an unknown number of birds.

North Carolina where game shipments were formerly made out of season vigilance of the common carriers had brought about an immediate cessation of shipments at the close of the open season.

The Department is also cooperating with local authorities in preventing the shipment and export of cage birds captured in violation of State laws. With two or three important exceptions the traffic in cage birds is now almost entirely restricted to foreign species and birds, like canaries, which are raised in captivity. As soon as certain States in the South have placed restriction on the capture and sale of mockingbirds, cardinals, and nonpareils, the wholesale capture of these valuable birds for sale in northern cities and foreign markets will be prevented.

PROTECTION OF GAME IN ALASKA.

The act of June 7, 1902 (the Alaska game law), has imposed heavy responsibility on this Department, which the absence of a specific appropriation has made extremely difficult to meet. Until competent wardens can be employed for certain important regions, it will be impossible to prevent wholesale destruction of game or to bring about even a reasonable observance of the law. At present all that is possible is to make the provisions generally known and to enforce restrictions governing shipment of game from the Territory. The work of the year was necessarily largely experimental. Two or three consignments of hides for the trade were held temporarily at San Francisco and Seattle, the effect of which action was to discourage such shipments. The wholesale shipment of deer hides totally ceased; but, as often happens in the case of a new statute, some of the provisions were misunderstood, and in certain quarters the impression gained credence that the shipment of black bearskins was prohibited, and the trade in these furs was temporarily curtailed. In spite of the prohibition of the sale of heads and skins of game animals, applications were received for the shipment of some trophies which were undoubtedly intended for sale. Prior to the 1st of May 59 permits were issued for the shipment of trophies and specimens, most of which consisted of bear, moose, and sheep from the Kenai Peninsula. Pending the issue of departmental regulations, about 30 applications were suspended in May and June on the understanding that permits would be issued before the opening of the season and arrangements made so that applicants who had not received their permits might ship trophies without unnecessary delay.

PELICAN ISLAND RESERVATION.

For several years past the State of Florida has made efforts to protect certain plume birds by special statute, and later, in 1901, by the passage of a general law prohibiting the killing of all birds other than game. The committee on bird protection of the American Ornithologists' Union has cooperated in this work, and for three years has directed its efforts to the preservation of a breeding colony of brown pelicans inhabiting a small island in Indian River, on the east coast, near the town of Sebastian. This island is less than 4 acres in extent, and during the breeding season is occupied by from 2,000 to 3,000 pelicans. It was found, however, notwithstanding the State laws and the presence of a special warden, that protection was inadequate. The Department, therefore, on request of the American Ornithologists'

Union and the Biological Survey, presented the matter to the Secretary of the Interior, requesting that, if practicable, the island be set aside as a reservation. This request was approved, and on March 14, 1903, the President of the United States issued an order setting aside Pelican Island as a reservation for the protection of native birds under the charge of the Department of Agriculture. A warden was at once appointed, and, with the continued cooperation of the American Ornithologists' Union, every effort is now being made to preserve the colony.

PUBLICATION OF INFORMATION CONCERNING BIRDS.

By a special provision in the Lacey Act the Secretary of Agriculture is required to collect and publish useful information relating to the propagation, uses, and preservation of birds. The publications thus far issued have related chiefly to preservation, and have comprised circulars, posters, and bulletins relating to State and Federal laws. Each year a bulletin has been issued giving briefly the provisions of State laws, particularly those which affect interstate commerce in game. The laws relating to birds other than game have also been collected and issued as a special publication (Bulletin No. 12). Posters and circulars have been distributed from time to time showing close seasons in the United States and Canada (including those in States which have county legislation), requirements of the shipping laws covering game, details relating to the enforcement of the Lacey Act, and similar matters. A condensed list of game officials and organizations was published in the Yearbook of the Department for 1902, and separates have been sent out wherever they would prove useful. The demand for these publications is large and is constantly increasing. Seventy thousand copies of the bulletin entitled "Game laws for 1902" were published, and Bulletin No. 12 has been republished or revised three times. So great has the demand now become for a general publication on game laws that it exceeds the resources of the Division, and such a publication can only be issued in very condensed form as a Farmers' Bulletin. But the appreciation of these publications is shown not alone in the demand for them, but also in the use made of them. Our "Game laws for 1902" was republished entire in the annual report of the game commissioner of Indiana; portions of the same bulletin were republished by the game warden of Maryland; diagrams and maps taken from it have been reproduced in books issued by private publishers, and both text and diagrams are often utilized by the press. The information thus distributed is most sought at the time when amendments to game laws are under consideration, and it is not too much to say that the rapid progress in bird and game protection during the last three years may be largely attributed to the publication by the Biological Survey of the various methods of protection which have been adopted by the several States. Especially is this progress noteworthy in the case of nongame birds, which are now protected by a practically uniform statute in 27 States. The bulletin on this subject has also attracted attention in other countries, particularly in Brazil and Mexico, and two notable articles have just been published advocating the adoption of a system of protection for nongame birds in the countries named similar to that which has proved so effective in the United States.

Numerous requests for data on foreign game laws have emphasized

the importance of securing information along these lines, and during the year, with the assistance of the Department of State, copies were secured from nearly all the European governments of existing statutes relating not only to game and nongame birds, but to payment of bounties for the destruction of noxious animals. The Division has also sought to secure copies of the licenses, resident and nonresident, now issued in several States, and to collect samples of the shipping tags and circulars used by the trade in interstate commerce in game. It has begun the preparation of a special report on methods of enforcing game laws in vogue in the several States, and on the distribution, migration, and protection of shore birds. As already stated, it has undertaken an extensive investigation of the food of game birds, and, in cooperation with the Division of Botany, is collecting material to illustrate the food of waterfowl, with special reference to the important ducking grounds in the upper Chesapeake and Currituck Sound.

BIRD MIGRATION.

During the year a bibliography of works relating to the occurrence of North American birds south of the United States was completed. It covers the period from the time of Linnæus to the present and contains 694 titles, divided into the following categories: West Indies, 160; Central America, 205; South America, 329. A bulletin is in progress on the distribution and migration of 16 representative species of shore birds, designed to serve as a basis for intelligent legislation as to the close seasons necessary for the preservation of the species and for their adequate protection in their winter homes. Maps have been prepared showing the summer and winter distribution of three of the most important of these species.

All of the migration material collected in the past nineteen years has been overhauled, rearranged, and catalogued to date, so that it is now readily accessible.

PUBLICATIONS.

The publications issued during the year include one number of North American Fauna (No. 22), one bulletin (No. 17), two articles, and a list of game officials and organizations in the Yearbook for 1902, one circular (No. 38), the report of the Division for 1902, one Farmers' Bulletin (No. 160), three large posters showing the close seasons for game, and eight reprints of former publications.

North American Fauna No. 22, by Edward A. Preble, treats of a biological investigation of the Hudson Bay region; Bulletin No. 17, by Sylvester D. Judd, on "The birds of a Maryland farm," embodies the results of long-continued observations on the economic relations of birds to local crops. The Yearbook articles are "Audubon societies in relation to the farmer," by Henry Oldys, and "The Agaves, a remarkable group of useful plants," by E. W. Nelson. Circular No. 38 is entitled "Interstate commerce in birds and game," and relates to laws covering the subject. Farmers' Bulletin No. 160 consists of a compilation of the game laws in force in the United States and Canada in 1902. The posters (Nos. 3, 4, and 5) give the close seasons for game in the United States and Canada, in Maryland, Virginia, and the District of Columbia, and in North Carolina and Tennessee. Three reprints were required of Farmers' Bulletin No. 54, "Some common

birds in their relation to agriculture," by F. E. L. Beal, making a total of 315,000 copies issued since 1897, the date of original publication. Reprints were issued also of Farmers' Bulletin No. 160, "Game laws for 1902;" Bulletin No. 12, "Legislation for the protection of birds other than game birds;" Circulars 36 and 37, "Importation of reptiles into Hawaii" and "Regulations for the importation of eggs of game birds for propagation;" and one Yearbook article, "The meadow lark and the Baltimore oriole" (1895).

INDEX OF MAMMAL NAMES.

The necessity for a complete and modern index of the family and generic names of mammals has led the Biological Survey to prepare such an index. This work, which has been in charge of T. S. Palmer, was completed during the year and the volume is now in press.

ROUTINE WORK.

During the year the routine work steadily increased. This work consists of correspondence, accounts of expenditures, preparation of reports and bulletins for publication, identifying and labeling specimens, care of collections, cataloguing bird stomachs received, tabulating details of stomach examinations, arranging and tabulating field reports, sorting and filing published matter valuable for reference, mapping distribution of birds and mammals, attention to the needs of field naturalists, developing photographic negatives and making prints from them, compiling game laws, issuing permits for the entry of foreign mammals and birds and for the export of trophies and specimens from Alaska, and cooperation in enforcing the various provisions of the act of Congress of May 25, 1900. The letters received during the year numbered about 5,400. Many of these were accompanied by schedules or reports, while others contained material also of permanent value. During the same period about 4,000 letters were written and 800 blank migration and other schedules were distributed to observers. The collection of photographic negatives made by members of the Biological Survey while in the field now numbers over 6,000, and is of constantly increasing value for purposes of study and illustration.

OUTLINE OF WORK FOR THE YEAR 1904.

SECTION OF GEOGRAPHIC DISTRIBUTION.

Field work in California for the fiscal year 1903–1904 will include a continuation of the biological survey of the foothill belt of the Sierra Nevada, a biological reconnaissance of some of the coast valleys, and a comprehensive study of the food habits of birds in a number of the important fruit-growing districts of the State. Some of the forest reserves of the Pacific slope will be visited for the purpose of determining their fitness for game refuges. It is hoped that a suitable home may be found for the herd of elk in Kern County, Calif., generously presented to the Government by Miller and Lux, and for such other game as may be received by the Government for the protection necessary to prevent its extinction.

In Texas, field work in the Panhandle region will be finished, connecting and finally completing the labors of previous years. The

results of this work will be included in a report on a biological survey of Texas, now well advanced toward publication.

Field work in New Mexico will be continued; northern and central Mexico will be visited for the purpose of completing former field work; and exploration in Alaska will be conducted in the northern spurs of the Rocky Mountains, about the upper and middle Yukon, and among some of the islands of the southern part of the Territory. A report on the work done about the base of the Alaska Peninsula in the summer of 1902 is nearly ready for the press, and will appear shortly. Explorations in the province of Mackenzie will be continued, and an effort will be made to determine the northern ranges and distribution of various forms of boreal life, so as to supplement the work already done about Great Slave Lake and Athabasca River and to furnish material for a report on the general region.

SECTION OF ECONOMIC ORNITHOLOGY.

The economic study of birds in the fruit orchards of California will be continued through the summer and early fall in order to ascertain the relation of certain important species to the horticulturist and ranchman. It is believed that careful field observations, supplemented by stomach examinations, will settle the question as to whether certain species are beneficial as destroyers of insects and weed seeds or injurious as devourers of fruit and grain. The results of these investigations will appear in a bulletin on "The economic relations of the birds of the Pacific slope."

Many parts of our country are subject to periodic invasions of noxious insects, which, by preying upon the farmers' crops, cause heavy financial losses. It is believed that if competent trained observers were sent to infested localities at the time such insects are in the act of devastating the crops much of value might be learned as to the controlling influence of birds in lessening the extent of the destruction and in checking the increase of the pests. With this object in view it is planned to investigate such outbreaks as may hereafter occur, in cooperation with the Division of Entomology, by sending a member of the Survey, when such a course is practicable, to study carefully the food habits of birds in the infested district.

For a number of years efforts have been made to secure stomachs of birds in certain groups of economic importance (as the upland game birds, flycatchers, swallows, thrushes, and titmice), and as soon as enough material to insure safe conclusions has been received reports covering the food habits of the species included in these groups will be published. With regard to certain groups concerning whose economic status much supplementary stomach material has come in, it is desirable to revise and supplement the earlier publications as soon as practicable. In the case of the woodpeckers, for example, more additional stomachs have been received than were used in the preparation of the original report.

It is expected that the bulletin on the food habits of the woodcock and upland game birds will be ready for publication before the close of the current year. The data for this investigation have been obtained by field observations and by laboratory examinations of more than 1,500 stomachs. The result shows that game birds do comparatively little harm to crops, while they consume large quantities of injurious insects and noxious weed seeds. Since game birds, in addi-

tion to their usefulness in connection with agriculture, have a high value as items of food and objects of sport, their habits deserve especially careful study.

SECTION OF GAME PROTECTION.

Plans for the coming year contemplate work upon a somewhat broader scale than heretofore. In addition to the issue of bulletins and posters containing summaries of the game laws, a report on game commissions and methods of enforcing game laws will be completed, and several circulars relating to topics of special interest in connection with game protection will be prepared. To enable the office to meet the numerous demands made upon it for information regarding game laws, a bibliography on this subject has been begun, as well as an abstract of the more important decisions of the courts which have a bearing on game protection. Work along both these lines will be continued during the year.

Certain species of game birds, notably the wood duck, woodcock, and upland plover, are rapidly becoming rare, and efforts will be made to obtain information respecting their present abundance in certain sections. It is proposed, if practicable, to make an investigation of the ducking grounds along the Atlantic coast, and also to obtain accurate information regarding the breeding colonies of certain water birds on the Pacific coast with a view to suggesting means for their protection.

Legislation of the past spring has made the Lacey Act effective in some States where heretofore shipment of game has been practically unrestricted. During the coming season special attention will be paid to the shipment of upland game from the States immediately west of the Mississippi and of waterfowl from the Southwest. Data will be collected respecting the methods employed by the trade in capturing, shipping, and storing game. In this connection attention is called to the fact that under present laws while the shipper may be made to pay the penalty for forwarding game illegally, it is almost impossible to convict the consignee or agent. The consignee is usually directly responsible for unlawful shipments of game, in that he offers the inducements through which the violations occur, and often lends direct aid to the shipper by furnishing information as to how the laws may be successfully evaded. Additional legislation will be necessary to fully overcome this difficulty.

Under the Alaska game law, regulations will be issued with a view to restricting export of heads and hides and furnishing special protection to certain kinds of big game. The caribou of the Kenai Peninsula and the walrus are both greatly reduced in numbers, and a close season of five years will be established for these species. In view of the large number of persons who visit the Kenai Peninsula to hunt big game, provision should be made at an early date for the appointment of wardens, to be charged with the enforcement of the game law, at least during the open season. Should an appropriation be made for this purpose it will be possible to make the law effective on the Kenai Peninsula and at other exposed points in the Territory at comparatively small cost.

BIRD MIGRATION.

During the current year bulletins on "Migration of North American warblers" and "Migration and protection of shore birds" will be pub-

lished and a report on bird migration in the Mackenzie Valley will be completed. The latter will show that the movements of birds in this region, so far as known, appear to differ from those in any other part of the world. It will be accompanied by maps intended to explain how these strange phenomena of migration are caused by the progression of the season.

During the last two years an investigation has been in progress concerning the migrations and winter ranges of 126 species of land birds which pass the winter in places south of the eastern part of the United States. It is expected that this work will furnish material for a study of the general problem of the bearing of migration routes of North American birds on the question of the origin of migration and the routes of dispersion on this continent.

RECOMMENDATIONS.

The Biological Survey is charged by Congress with three distinct lines of work, each of coordinate value with the ordinary departmental "division." These are: (1) Section of geographic distribution; (2) section of economic ornithology; (3) section of game protection.

In submitting estimates for the fiscal year 1905 the following recommendations are respectfully made:

(1) That the Biological Survey be reorganized as a bureau with three sections as separate divisions.

(2) That an increase in the statutory roll of $1,450 be granted to enable the Secretary to reorganize the Biological Survey as a bureau of the Department.

(3) That an increase of $12,000 in the lump fund be granted to provide for the greatly increased demands for information and field work on geographic distribution, economic ornithology, and game preservation, and to enable the Survey to retain the services of trained assistants.

(4) That an increase of $4,000 be granted to enable the Secretary to transport, fence, and maintain elk and other animals on forest reserves and other public lands. This is the minimum amount necessary to make a real beginning, since the current appropriation of $1,000 for the purpose has proved utterly inadequate.